The evaporation of sugar juices from the viewpoint of new constructions. V. Sázavský. *Listy Cukrovar.* 56, 480-91, 403-5(1938).—S. discusses the design of vertical tube evaporators with special reference to the models Robert, Radikal and Skoda-Sázavský, the latter model having (1) a flow of steam and condensate in the same direction, (2) the steam outflow beyond the steam chamber instead of before it, (3) a quick entrance of the liquor into the heating chamber and (4) an increased (10)% heating surface at a small increase in cost. — Frank Maresh

ASM SLA METALLURGICAL LITERATURE CLASSIFICATION

28

Heat analyses in mixed sugar factories. V. Surayski and K. Sumiera. *Listy Cukrovar.* 60, 80-83(1941). —The previous consts. based on 1000 campaign reports were not universal because the questionnaires contained reports which could not be expressed in universal units. Operations during a single season from 52 sugar establishments are presented in a table and show the following av. values: digestion 17.60%, polarization of the heavy liquor 81.46%, the quantity of heavy liquor as 28.75%, of the wt. of beets,

the quantity of water evapd. 83.00% of the wt. of the beets, the wt. of the discharge waters 100.88 q., the thermic units in the coal consumed per q. of beets 37.51, the thermic units in the steam consumed per q. of beets 25.97, and a boiler effect 89.95%.   Frank Maresh

A S 8 - S L A   METALLURGICAL LITERATURE CLASSIFICATION

Actual technological problems of the sugar indus. Czechoslovakia. Václav Šťastný. *Listy Cukrovar.* 121-2(1949).—The 1948-49 season yielded 3.8-4.0% molasses instead of the anticipated 3.3-3.1%, a situation which reduces the production of sugar by 0.6%. Causes are the use of imported, foreign brands of sugar beets not adapted to the native soils, the high mineral content of the sugar beets, high mineral content of sugar juices, the use of soda in digestion, and inadequate chem. processes for removing the sugar from sirups. Frank Maresh

CA

28

Current problems in sugar technology. II. The heat economy. V. Sázavsky. *Listy Cukrovar.* 65, 193-6 (1949); cf. C.A. 43, 8713e. --Because the heat balance is influenced by the performance of the evaporators, S. presents a computation of the heat interchange in the evaporators at Hrušovany.   Frank Maresh

A S A . S L A   METALLURGICAL LITERATURE CLASSIFICATION

SAZAVSKY, V.   Czechoslovakia   CA:47:11778

with K. SANDERA,M. DRACHOVSKA-SIMANOVA

"Causes of an explosion in an evaporator after the campaign."

Listy Cukrovar. 66, 118-20(1949-50); Sugar Ind. Abstr. 12,61(1950)

SAZAVSKY, V.   Czechoslovakia   CA: 47:12847

"Present problems in the sugar industry. VI. Chemical control in sugar factories."

Listy Cukrovar. 66, 121-3 (1949-50).

Sazavsky, V.

Current problems of the sugar industry. XI. Final alkalinity and lime content of juices. V. Sázavský (*Listy Cukr.*, 1954, 70, 128–130).—In factory operation the presence of excess lime did not

gases, and the condensate contains less CO_2, and is more suitable for sweetening off muds. SUG. IND. AUSTR. (E. M. J.)

SHZAVSKY, V.

The dimension of evaporators. II. Temperature drop and specific heat load of heating surface. V. Sázavský. *Listy Cukrovar.* 70, 218-21(1954); cf. *C.A.* 49, 13791. This study is a continuation of previous articles dealing with math. and theoretical phases of sugar production. J. L.
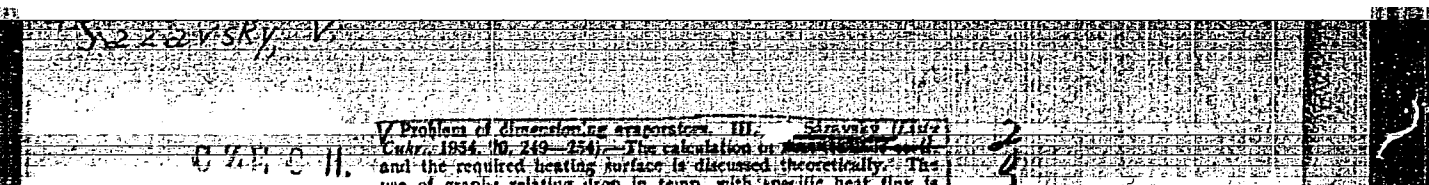
ZAZEVSKY, V.

C. Z. P. C. H.

V Problem of dimensioning evaporators. III. Stavnsg (Listy Cukr. 1954, 10, 249—254)—The calculation of and the required heating surface is discussed theoretically. The use of graphs relating drop in temp. with specific heat flux is
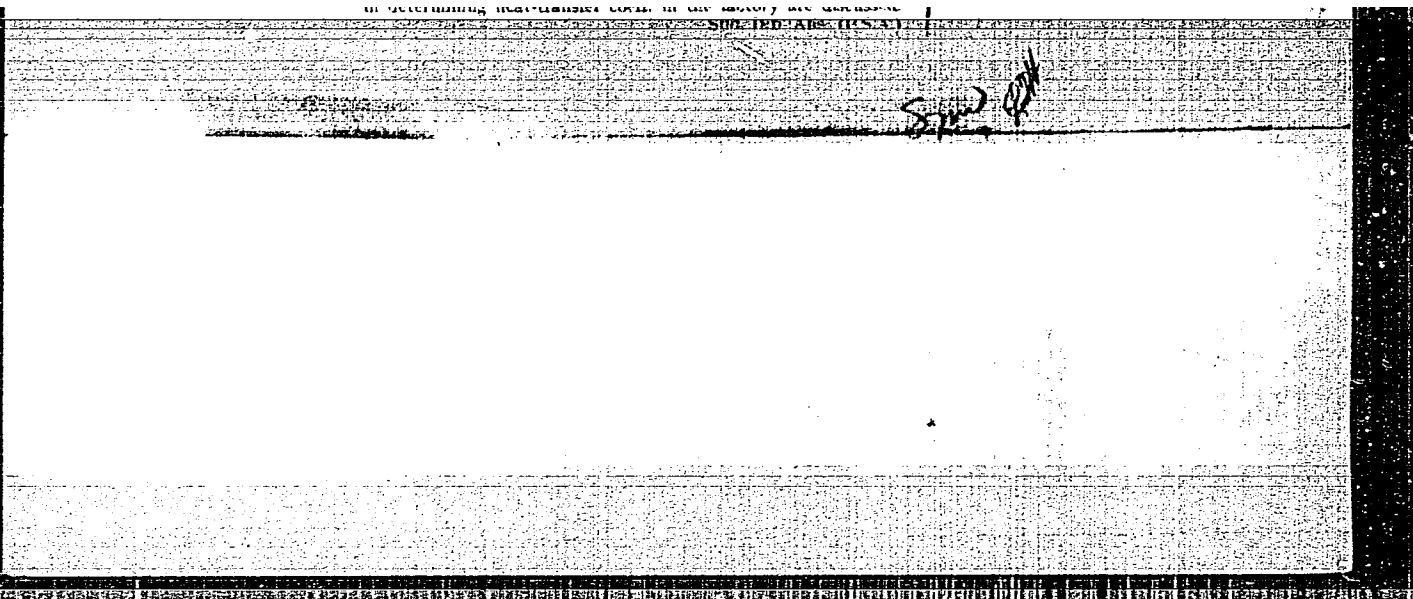
U. SAZAUSKY

CZECHOSLOVAKIA / Chemical Technology, Chemical Products and   H-25
                Their Application. Part 3 - Carbohydrates
                and Their Treatment.

Abs Jour   : Ref. Zhur. Khimiya, No 4, 1958, 12741.

Author   : V. Sazavsky.

Inst   : Not given

Title   : Design of Evaporators. IV. Attainable Minimum Steam
              Consumption. V. Losses in Piping.

Orig Pub   : Listy cukrovarn., 1955, 71, No 2, 25 - 26; 1956, 72, No 2,
              27 - 29.

Abstract   : IV. In the result of the discussion of various computa-
              tion methods of steam consumption at an evaporation plant
              and of a number of test examples, it is shown that the steam
              ccnsumption in the amount of 40% by weight of the sugar beet
              treated for raw sugar production can be attained with the

Card 1/3

CZECHOSLOVAKIA / Chemical Technology, Chemical Products and   H-25
                Their Application. Part 3 - Carbohydrates
                and Their Treatment.

Abs Jour   : Ref. Zhur. Khimiya, No 4, 1958, 12741

Abstract   : modern equipment of sugar factories. The application of
              high pressure boilers and economical steam turbines allows
              to decrease this consumption to 30 or 32% on condition that
              the returning steam under the pressure of 3 abs.atm. would
              be bled off in the amount not greater than 20% by weight of
              sugar beet.
              V. The efficiency of evaporations depends in a great
              measure on the pressure loss and the temperature drop in pi-
              ping. These losses are caused by incorrect computation of
              pipe diameters and undortunate choice of fittings. The re-
              sults of decreasing the pressure and temperature drops by
              changing the pipe diameters and the construction of traps and
              by exchanging the fitting type are shown on examples, for
              which purpose a table of equivalent lengths of various fit-

Card 2/3

CZECHOSLOVAKIA/Chemical Technology - Chemical Products and Their   I-11
        Application. Carbohydrates and Refinement.

Abs Jour   : Ref Zhur - Khimiya, No 1, 1958, 2788

Author   : Sazavsky Vaclav
Inst   :
Title   : Technical-Organization Measures for the Decrease of Steam
              Consumption.

Orig Pub   : Listy cukrovarn., 1957, 73, No 6, Inform. sluzba, 22-24

Abstract   : Practical measures are described for reducing thermal
              losses at a sugar refinery. In particular, it is recom-
              mended to make maximum use of hot condensate as boiler
              feed, correctly to select the cross-sections of steam
              pipes, control burning at heating surfaces, etc. It is
              noted that a saving in fuel, up to 20%, can be achieved.

Card 1/1

SAZAVSKY, V.; NOVACSEK, Janos, dr. [translator]

Steam jet compressors in Czechoslovak sugar factories. Pt.3.
Cukor 11 no.4: 89-94   Ap'58

SAZAVSKY, V.

TECHNOLOGY

Periodical: LISTY CUKROVANICKE. Vol. 74, no 9, Sept. 1958

SAZAVSKY, V. Methods of reducing the molasses production. p. 197

Monthly List of East European Accessions (EEAI) LC, Vol. 8, no. 3
March 1959 Unclass.

SAZAVSKY, V.

TECHNOLOGY

periodicals: LISTY CUKROVARNICKE Vol. 74, no. 12, Dec. 1958

SAZAVSKY, V. Orientation indexes applied for the second-rate products
in sugar factories. p. 275.

Monthly List of East European Accession (EEAI) LC Vol. 8, no. 5
                                              May 1959, Unclass.

SAZAVSKY, V.

"Present problems of low-grade sugar."

LISTY CUKROVARNICKE, Praha, Czechoslovakia, Vol. 75, No. 4, April 1959.

Monthly List of East European Accessions (EEAI), LC, Vol. 8, No. 9, September 1959.

Unclassified.

SAZBO, M. T.

Incorporation of radioactive amino acids and amylase synthesis in pancreatic tissue in vitro. T. Garzó, K. Perl, M. T. Sazbo, A. Ullmann, and F. B. Straub (Univ. Budapest) *Acta Physiol. Acad. Sci. Hung* 11, No 1, 23-9 (in German). —Radioactive glycine and tyrosine are incorporated into tissue slices of pigeon pancreas in parallel with synthesis of amylase. The amylase synthesis is

SAZBO, Zoltan; SOLYMOSI, Frigyes

Correlation between the electrical and catalytic properties
of the defect conducting oxides. Magy kem folyoir 66
no.11:469-475 N '60.

1. Szegedi Tudomanyegyetem Szervetlen es Analitikai Kemi-
ai Intezete. 2. "Magyar Kemiai Folyoirat" szerkeszto
bizottsagi tagja (for Szabo).

ACC NR: AP7000338   SOURCE CODE: UR/0413/66/000/022/0098/0099

INVENTOR: Blinov, D. P.; Ovcharenko, Ye. Ya.; Sazhayev, V. G.; Feygin, V. I.;
Shleyfman, Kh. M.

ORG: none

TITLE: Device for automatic detection of flaws on a moving surface. Class 42,
No. 188685 [announced by the Design Bureau of Automation in the Nonferrous Industry
(Konstruktorskoya byuro "Tvetmetavtomatika")]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 22, 1966, 98-99

TOPIC TAGS: metal surface, flaw detection, metal inspection, optic method, optic
instrument

ABSTRACT: This Author Certificate introduces an automated flaw detector for the
inspection of a moving surface of an article such as a metal strip. The detector con-
tains a source of light and an optical system for the concentration of luminous flux,
which is placed in front of a panel with light guides and with light-sensitive elements
connected to the electronic inspection device. To increase the sensitivity to small
flaws and to facilitate the inspection of wide strips, the instrument has branched
light guides which ensure an optical connection between the source of light, the
inspected surface, and the light sensitive elements. In a variant, the adverse effect
of vibration of the inspected surface on the instrument performance is reduced by

Card 1/2   UDC: 620.179

ACC NR: AP7000338

V-form light guides which ensure a perpendicular direction of the light flux toward the inspected surface. In a second variant, the inspection of any shaped surface is done by light guides assembled in a bundle whose shape corresponds to that of the inspected surface. Orig. art. has: 1 figure.

SUB CODE: 13/   SUBM DATE: 22May64/

Card- 2/2

ANFILOV, A.A., inzh ; BAKALEYNIK, Ya.M., inzh.; BIRGER, G.I.,
inzh.; BRUK, B.S., inzh.; BUROV, A.I., inzh.; GINZBURG, V.L.,
inzh.; ZABELIN, V.L., inzh.; ZAPLECHNYY, Ye.G., inzh.;ISAYEV,
D.V., inzh.; KLIMOVITSKIY, A.M., inzh.; KRYUCHKOV, V.V., inzh.;
KOTOV, V.A., inzh.; LEYDERMAN, A.Ye., inzh.; PODGOYETSKIY,
M.L., inzh.; SAZHAYEV, V.G., inzh.; SEVAST+YANOV, V.V., inzh.;
FILIPPOV, S.F., inzh.; FROMBERG, A.B., inzh.; SHNEYEROV, M.S.,
inzh.; ERLIKH, G.M., inzh.; VERKHOVSKIY, B.I., red.; ZUBKOV,
G.A., red.; KARKLINA, T.O., red.; OVCHARENKO, Ye.Ya., red.;
ANTONOV, B.I., ved. red.

[New means of automatic and centralized control for nonfer-
rous metal mines] Novye sredstva avtomatizatsii i dispetcher-
skogo upravleniia dlia rudnikov tsvetnoi metallurgii. Moskva,
Nedra, 1965. 93 p.   (MIRA 18:4)

SAZHENIN, P.A.

Case of spontaneous mediastinal emphysema. Vrach.delo no.9:975 S
'59.   (MIRA 13:2)

1. Kafedra khirurgii (zaveduyushchiy - zasluzhennyy deyatel' nauki,
prof. A.K. Gorchakov) stomatologicheskogo fakul'teta Kiyevskogo medi-
tsinskogo instituta.
        (EMPHYSEMA)   (MEDIASTINUM--DISEASES)

BUTENKO, Z.A.; BLEYKHERMAN, N.A.; ZAK, K.P.; SAZHENIN, P.A.; YAROSH, S.I.

Methods for counting eosinophiles directly in the calculating
chamber. Vrach.delo no.2:199-201 F '59.   (MIRA 12:6)

1. Laboratoriya endokrinnykh funktsiy (rukovoditel' - akad. AN
USSR V.P.Komissarenko) Instituta fiziologii AN USSR, kafedra
patofiziologii (zav. - prof.O.A.Bogomolets) Kiyevskogo instituta
usovershenstvovaniya vrachey, kafedra khirurgii stomatologiche-
skogo fakul'teta (zav. - zasl.deyatel' nauki, prof.A.K.Gorchakov)
i kafedra akusherstva i ginekologii (zav. - prof.A.Yu.Lur'ye
[deceased]) Kiyevskogo meditsinskogo instituta.
                        (EOSINOPHILES)

SAZHENIN, P.A.

Change in ghe neutral 17-ketosteroids and in the sugar metabo-
lism in tumors of the adrenal cortex. Vrach.delo no.3:315-317
Mr '60.   (MIRA 13:6)

1. Khirurgicheskaya klinika stomatologicheskogo fakul'teta
(zav. - zasluzhennyy deyatel' nauki, prof. A.K. Gorchakov)
Kiyevskogo meditsinskogo instituta.
    (ADRENAL CORTEX--TUMORS) (SUGAR IN THE BODY) (STEROIDS)

/5. 9300
~~20 (5)~~

66967
SOV/32-25-11-41/69

AUTHORS: Gorelik, B. M., Bukhina, M. F.,
             Sazhenov, A. F.

TITLE: Method for Measuring Contact Pressure in Compression of
             Rubber Samples Within a Wide Temperature Range

PERIODICAL: Zavodskaya laboratoriya, 1959, Vol 25, Nr 11, pp 1373-1375 (USSR)

ABSTRACT: The present test method was developed under the cooperation of
             Ye. D. Kurich and A. A. Lavrent'yev. A steel clamp of small
             dimensions (Fig 1) was desgined, in which the contact pressure
             is measured by means of resistance strain gauges. The clamp can
             be placed in a hermetically sealed cooling chamber, or in a
             thermostat. Several clamps of this type can be joined to the
             measuring apparatus, rendering possible simultaneous measure-
             ment of several samples. The measuring range is 1-200 kg for
             samples compressed by 10-90%. The tested rubber sample is pressed
             by a pressure plate against the center bit (a lamella
             1.5-3 mm thick) of the clamp, the latter serving as dynamometer.
             The pressure is transmitted to the lamella by the sample, so
             that the deflection of the lamella indicates the elongation
             deformation, and the peripheric part of the lamella indicates
             the compression deformation. Measurement of these two

Card 1/2

Method for Measuring Contact Pressure in Compression
of Rubber Samples Within a Wide Temperature Range

56967

SOV/32-25-11-41/69

deformations is effected by two strain gauges. The dimensions
of these gauges must be adjusted to those of the dynamometer
(of the lamella) (Fig 2). The thickness of the lamella is of
particular significance, since the deflection at maximum load
may not exceed 0.001 of the sample height. A tensometric unit
of type DU-2 was used. A milliammeter or loop oscillograph
can be used for recording. For measuring simultaneously at
several clamps the authors employed a scheme similar to that
by Prigorovskiy and coworkers (Ref 7). Determinations of the
dependence of the contact pressure on the temperature, using
rubber based on SKN-40 rubber, show (Fig 3) that the contact
pressure drops to 0 in the proximity of the vitrification
temperature. At around -20°C the contact pressure drops by
about 80%. The modulus of the rubber investigated is 70 kg/cm^2,
i.e. the degree of compression must be 15% at the minimum
(Ref 9). There are 3 figures and 9 references, 8 of which
are Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti
Card 2/2   (Scientific Research Institute of the Rubber Industry)

SAZHENOV, G.; BRITVINA, Z.

Feeding and Feeding Stuffs

Fodder cabbage. Kolkh.proizv. 12, No. 9, 1952.

9. MONTHLY LIST OF RUSSIAN ACCESSIONS, Library of Congress, December 1952. Uncl.

SAZHENOV, M.K.; BUROVOY, I.A.; PETROVA, L.Yu.

Automatic control of the wet method of dust suppression. TSvet.
met. 26 no.2:39-46 Mr-Ap '53.   (MLRA 10:9)
                (Automatic control)   (Dust--Removal)

REZNIK, I.D.; BULGAKOV, V.I.; SAZHENOV, M.K.

Measuring waste gas temperatures for the automatic control of the
speed of pallet movements in sintering machines. TSvet.met. 35
no.2:29-36 F '62.
(MIRA 15:2)
(Sintering)   (Automatic control)

1. SAZHIN, A. I.

2. USSR (600)

4. Potatoes

7. Effectiveness of fertilizers and watering in irrigation potato farming.
   Sad i og. no. 11, 1952.

9. Monthly List of Russian Accessions, Library of Congress, March 1953. Unclassified.

SUKHARINA, A.N.; SAZHIN, A.I.; SPANDERASHVILI, G.I.

Phosphorite-bearing area in Gronaya Shoriya. Razved. i okh.
nedr 27 no.2:10-17 F '61.   (MIRA 14:5)

1. Zapadno-Sibirskoye geolupravleniye.
                (Gornaya Shoriya--Phosphorites)

ACCESSION NR: AP4049495   S/0122/64/000/011/0043/0046

AUTHOR: Sazhin, A. M. (Engineer)

TITLE: Stress calculation in cemented joints of metallic plates under shear

SOURCE: Vestnik mashinostroyeniya, no. 11, 1964, 43-46

TOPIC TAGS: metal joining, metal to metal bonding, structural mechanics/ D16T
aluminum alloy, BF 4 cementing material

ABSTRACT: Several computational relationships for determining stresses in cemented
metal joints under shear are presented. The method of A. A. Popov (Soprotivleniye
materialov. Mashgiz, 1956) is taken as the problem solution sequence, with the
assumptions usually found for problems of material strength. Both cement layers and
parent materials are regarded as obeying Hooke's Law in the derivation of equations
describing an ordinary lap-joint with shear stress applied longitudinally. Stress
distribution along the joint is plotted for the particular case of aluminum alloy
D16T joined by BF-4 cementing material for a given joint configuration. The problem
of deflection with both plate and cementing material is considered. A plot is pre-
sented of the joint stresses at a load of 900 kg (the stress limit). Further
expressions are presented for the case of deflection of a symmetric joint with

Card 1/2

L 19696-65
ACCESSION NR: AP4049495

plates sheared along an axis in the cementing zone. Theoretical and experimental results are compared with earlier work by E. Kamke (Spravochnik po oby*knovenny*m differentsial'nv*m uravneniyam. Fizmatgiz, 1961) and with Sb., "Klei i tekhnologiya

7 figures and 12 equations.

ASSOCIATION: none

SUBMITTED: 00   ENCL: 00

SUB CODE: ME ,MM   NO REF SOV: 003   OTHER: 000

Card 2/2

SAZHIN, A.M., Inzh.

Stress analysis of cemented joints of metal plates at shifting.
Vest. mashinostr. 44 no.11:43-46 N '64   (MIRA 18:2)

SAZHIN, A.P.

Fastening of rolls on axles of the sizing mill. Sbor. rats.
predl. vnedr. v proizv. no.2:30-31 '61.   (MIRA 14:7)

1. Chelyzbinskiy truboprokatnyy zavod.
                    (Pipe mills)

MIKHAYLOV, G.P., SAZHIN, B.P.

Determination of effective dipole moments of molecules and the structural factor of polar liquids and polymers. Zhur.tekh.fiz. 25 no.10:1696-1702 S '55.   (MLRA 9:1)
                (Molecules) (Dielectrics)

SAZHIN, B.I.

USSR/Physics, Dielectric losses, Polyethylene   FD-1217

Card 1/1   Pub. 153-1/22

Author   : Mikhaylov, G. P., Lobanov, A. M., and Sazhin, B. I.

Title   : Study of dielectric losses of low-frequency relaxation in polyethylene

Periodical   : Zhur. tekh. fiz. 24, 1553-1560, Sep 1954

Abstract   : The presence of dielectric losses was established in polyethylene at
               low-frequency relaxation. These losses are bound to the orientation
               of polar groups located in the crystalline phase of polyethylene. The
               concentration of polar groups $C = O$ of polyethylene found in crystal-
               line and amorphous phases is computed. Seven references including 3
               foreign. Tables; graphs.

Institution :

Submitted   : May 25, 1954

SAZHIN, B.I.

621.315.616.96 : 537.226.5
4124. Investigation of the dielectric losses of
polyethylene. G. P. MIKAILOV, S. P. KABIN AND
B. I. SAZHIN. Zh. tekh. Fiz., 25, No. 4, 590-4 (1955)
In Russian.

Three types of dielectric relaxation losses occur in
polyethylene, characterized by the following most
likely relaxation times: $\tau_1 = 10^{-9}$ sec (h.f.); $\tau_2 =$
10^{-5} sec (m.f.); $\tau_3 = 10^{-1}$ sec (l.f.). This is explained
by the partly crystalline structure of the material.
The losses themselves are due to the presence of polar
radicals C—O in the molecule. After thermal
treatment the absolute loss figures increase without
appreciable change of the temperature and frequency
relations of tan δ.

ELECTRICAL RESEARCH ASSOCIATION

SAZHIN, B.I.

USSR/Atomic and Molecular Physics - Physics of the Molecule, D-2

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 34308

Author: Mikhaylov, G. P., Sazhin, B. I.

Institution: None

Title: Determination of Effective Dipole Moments of Molecules and of the Structural Factor of Polar Liquids and Polymers

Original Periodical: Zh. tekhn. fiziki, 1955, 25, No 10, 1696-1702

Abstract: Generalizing the polarization equation for the case of variable fields, and taking into account the deformation portion of the polarization, the authors introduce a correction to the theoretical equation for the effective dipole moment $\mu\sqrt{\varepsilon}$. The authors calculate μ_0, the dipole moment of the free molecules, using $\mu\sqrt{\varepsilon}$. The authors calculate μ_0, the dipole moment of the free molecules, using the Onsager equation, generalized for the case of variable fields. The values of μ, the dipole moment of the molecule in condensed matter, is calculated with the Onsager equation, which presupposes a definite molecular model. In the calculation equations for $\mu\sqrt{\varepsilon}$, μ_0 and μ, there are included the following parameters: α, which characterizes the distribution of the relaxation time; ε'_m and ε''_m, which are the real and imaginary parts of the generalized dielectric constant. These

1 of 3

- 1 -

USSR/Atomic and Molecular Physics - Physics of the Molecule, D-2

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 34308

Author: Mikhaylov, G. P., Sazhin, B. I.

Institution: None

Title: Determination of Effective Dipole Moments of Molecules and of the Structural Factor of Polar Liquids and Polymers

Original Periodical: Zh. tekhn. fiziki, 1955, 25, No 10, 1696-1702

Abstract: quantities were determined from the temperature-frequency dependence of the generalized dielectric constant. In this work, the values of $\mu\sqrt{g}$, μ_0, μ, and g (structural factor) are determined for water, for several simple alcohols, nitrobenzols, α-bromnaphthalene, normal ketones, and polymers of the homological series of ethers of metacrylic acid. The structural factor g of water and of alcohols is approximately the same and is considerably greater than unity, this indicating, in the opinion of the authors, an absence of compensation for the dipole moments during association, and a presence of close order in the parallel axes of neighboring dipoles. In the normal ketones, the structural factor is approximately unity, indicating an equal probability of directions of dipole moments of neighboring molecules.

USSR/Atomic and Molecular Physics - Physics of the Molecule, D-2

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 34308

Author: Mikhaylov, G. P., Sazhin, B. I.

Institution: None

Title: Determination of Effective Dipole Moments of Molecules and of the Structural
    Factor of Polar Liquids and Polymers

Original Periodical: Zh. tekhn. fiziki, 1955, 25, No 10, 1696-1702

Abstract: For polymers of the homological series of ethers of metacrylic acid, the
structural factor is approximately the same and less than unity, this being ex-
plained by the dipole intermolecular interaction.

SAZHIN   B.L.

5

Dielectric losses of polyethylene. Σ. P. Mikhailov, B. I. Sazhin and S. P. Kabin. Trudy Leningrad. Politekh. Inst. im. M. I. Kalinina 1955, No. 181, 301-11.—Non

4E4$

4E2c3

SAZHIN, B.I.

SUBJECT	USSR / PHYSICS
AUTHOR	MICHAILOW, G.P., SAZIN, B.I.
TITLE	The Investigation of the Dielectric Polarization and the Losses of Polytrifluorchlorethylene.
PERIODICAL	Žurn.techn.fis, 26, fasc.8, 1723-1729 (1956)
	Publ. 8 / 1956 reviewed 9 / 1956

CARD 1 / 2   PA - 1271

Recently some polymers have been produced synthetically. In contrast to poly-tetrafluorethylene they were treated by the usual methods and have at the same time an increased resistance to heat. A typical representative of these materials is polytrifluorethylene (abbr. F-3), the molecules of which have the following structure:

$$\ldots CF_2 - CFCl - CF_2 - CFCl - \ldots$$
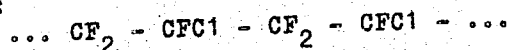
As an electro-insulating material it is of considerable interest. In view of the fact that its electric properties have been but little investigated and that, besides, it is a partly crystallized polymer, the present work was carried out. On the occasion of the examination of mechanical and electric properties, a considerable influence was found to be exercised by crystal structure. Curves concerning the temperature dependence of the dielectric con-stant, the tg of the angle of dielectric losses, of the modulus of the dis-placement "G", and of the logarithmic decrement Λ of the ceasing of the mechanical oscillations of polytrifluorethylene were recorded. The dielectric losses and the polarization of F-3 are connected with molecular processes which also determine the mechanic properties of the polymer. On the occasion of the

Zurn.techn.fis, <u>26</u>, fasc. 8, 1723-1729 (1956)   CARD 2 / 2   PA - 1271

examination of the $\mathcal{E}$ and the tg δ of F-3 on the frequencies from $50\text{-}10^7$ c
and at temperatures of from -100 to +230° C two kinds of relaxation-dielectric
losses and of losses of electric conductivity were discovered. Both kinds of
relaxation polarization are due to the polarity of the molecules of the
polymer and are essentially connected with the processes in amorphous regions.
This is confirmed by investigation of the mechanic properties of F-3. At
melting temperature of polytrifluorchlorethylene a jerk-like decrease of
$\mathcal{E}$ and tgδ was observed. The occurrence of hysteresis on the $\mathcal{E}$ and tgδ=f(t)
curves in the melting region is due to the slowing down of the crystallization
of the polymer from the melt.
It was not possible to discover the third kind of dielectric losses in F-3
which would be similar to the low frequency relaxation of polyethylene. This
seems to be partly due to the difference in the structure of the given
polymers.

INSTITUTION:

SAZHIN, BI

AUTHOR
TITLE:

MIKHAYLOV,G.P., SAZHIN,B.I., KUPRIYANCHIK,N.N.   PA 3546
Some Peculiarities of Dielectric Losses in Polycaprolactom.
(O nekotorykh osobennostyakh dielektricheskikh poter' poli-
kaprolaktoma, Russian)

PERIODICAL:

Zhurnal Tekhn. Fiz., 1957, Vol 27, Nr 5, pp 948 - 952 (U.S.S.R.)

ABSTRACT:

The present work is a continuation of the two previous ones
(Zhurnal Tekhn. Fiz., 1955, Vol 25, Nr 4, p 590 and Zhurnal Tekhn.
Fiz., 1956, Vol 26, Nr 8, p 1723). The initial material was
supplied in form of little plates by the All-Union Scientific
Research Institute for Artificial Fibres. The temperature depend-
ences of the dielectric losses of hardened and tempered samples
of polycaprolactome were investigated in intervals of from 20 -
150° at frequencies of 10^3 - 5.10^6 Hz. In the tempered polycarpo-
lactome the maximum dielectric relaxation losses were found to
exist. In the case of hardened polycaprolactome a second maximum
was, in addition, noticed on the temperature curves tg δ (angle of
dielectric losses), the position of which remains the same at all
frequencies. It was possible,by means of infrared spectroscopy,
to confirm the supposition that this maximum of tg δ is connected
with an additional formation of the hydrogen compounds in the
hardened polycaprolactome within the ranger $30 - 40^\circ$

Card 1/2

PA - 3546

Some Peculiarities of Dielectric Losses in Polycaprolactom.

(1 illustration and 5 Slavic references)

ASSOCIATION: LPI
PRESENTED BY:
SUBMITTED: 12.11.1956
AVAILABLE: Library of Congress

Card 2/2

ANDREYEVA, I.N.; ARKHIPOVA, Z.V.; VESELOVSKAYA, Ye.V.; LEVINA, A.A.;
    ANTOKOL'SKAYA, Ye.M.; LAZAREVA, N.P.; SAZHIN, B.I.; KHIN'KIS,
    S.S.; SHCHERBAK, P.N.; GERBIL'SKIY, I.S.; LYANDZBERG, G.Ya.;
    PARAMONKOVA, G.V.; PECHENKIN, A.L.; YEGOROV, N.M., obshchiy
    red.; SHUR, Ye.I., red.; ERLIKH, Ye.Ya., tekhn.red.

[Low-pressure polyethylene] Polietilen nizkogo davleniia.
Leningrad, Gos.nauchno-tekhn.izd-vo khim.lit-ry, 1958.   90 p.
                (Polyethylene)

AUTHORS: Mikhaylov, G.P., Sazhin, B.I., Presnyakova, V.S.

TITLE: Influence of the Density of Polytrifluorochloroethylene on
             Dielectrical Losses (Vliyaniye plotnosti politriftorkhlor-
             etilena na dielektricheskiye poteri)

PERIODICAL: Kolloidnyy zhurnal, 1958, Vol XX, Nr 4, pp 461-464 (USSR)

ABSTRACT: The degree of crystallization of polymers has a great effect
             on their physical properties. The crystallinity of a sub-
             stance is defined as the volumetric or weight ratio between the
             crystallized and amorphous parts of this substance. It is
             difficult, however, to determine the exact value of crystalli-
             nity. Presently, dilatometric, optic and roentgenographic
             methods are used, as well as the heat capacity and the nuclear
             magnetic resonance. In the article, the influence of the
             density of polytrifluorochloroethylene (F-3) on the value of
             the dielectrical losses is investigated with a view to de-
             termining the degree of crystallinity. In F-3, two forms of
             dielectrical losses of relaxation character have been establish-
             ed. Both are dependent on the temperature. Figure 1 shows
             that at a frequency of 80 kilocycles and a temperature of 78° C
Card 1/2   a maximum of the dielectric losses is observed. The data of

SOV-69-58-4-10/18

Influence of the Density of Polytrifluorochloroethylene on Dielectrical
Losses

Figure 2 show that the value of the dielectric losses of F-3
is directly proportional to the quantity of the substance in
the amorphous phase. The investigation has proved that the
degree of crystallinity may be determined by measuring the di-
electric losses. The method may also be used for measuring
crystallinity in rubber., etc.
There are 2 graphs, 1 table, and 3 references, 2 of which are
Soviet and 1 English.

ASSOCIATION: Leningradskiy politekhnicheskiy institut imeni M.I. Kalinina
                (Leningrad Polytechnical Institute imeni M.I. Kalinin)

SUBMITTED: April 3, 1957
                        1. Fluoroethylenes--Density

Card 2/2

SOV/57-2 3-9-19/33

AUTHORS: Sazhin, B. I., Lobanov, A. M., Gol'denberg, A. L.,
             Darinskaya, T. N., Marakhonov, I. A., Kabin, . P.

TITLE: Investigation of Some Properties of Gamma-Irradiated Poly-
             ethylene (Issledovaniye nekotorykh svoystv polietilene, pod-
             vergnutogo vozdeystviyu γ-izlucheniya)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1958, /Vol 28, nr 9, pp. 1991-1998 (USSR)

ABSTRACT: This article contains a report on a comphrehensive investi-
             gation of polythylene. These phenomena were studied: The in-
             fluence of atomic radiation upon the structure and the physi-
             cal properties, the infrared spectra and the intensity curves
             describing the dispersion of X-rays and the functions of
             density, of mechanical and of electrical properties versus
             temperature. Samples of a basic polyethylene synthesized under
             high pressure and samples of polyethylene subjected to the
             γ-radiation of a cobalt source in air were investigated. The
             samples had dimensions of 21 · 30 · 53 mm. The curves of the
             mechanical strength versus temperature function were recorded
             with the equipment **designed by** I. o. The cientific Research
             Institute of Polymerized Plastics. The tg δ (angle of dielec-

Card 1/5

SOV/57-2 3-3-19/33

Investigation of Some Properties of Gamma-Irradiated Polyethylene

tric losses) versus temperature function was recorded in the frequency range of 400 to $3 \cdot 10^5$ c. The measurements at $3 \cdot 10^9$ were made on a type KB-1 Q-meter — according to the perfected method of measuring the differences of the factor of merit. The temperature dependence of the mechanical losses at $5 \cdot 10^4$ c were investigated using the method of the compound vibrator (Ref 3). The study of the infrared spectra of non-stabilized polyethylene and of irradiated polyethylene substantiated the existence of processes earlier observed (Refs 1, 5). Besides, some data bearing on the modification of the structure of the macromolecule of polyethylene were obtained. Investigations of polyethylene subjected to γ-radiation from Co^{60} showed that the modifications of the structure of the macromolecule becomes manifest, when infrared spectroscopy investigations are carried out by a modification of the nature of the tg δ and the dielectric- and mechanical losses versus temperature functions. Notwithstanding the production of a "seam" the modification of the density and the percentual content of crystallized polyethylene caused by an irradiation by $(40 + 30) \cdot 10^6$ r is insignificant. G. P.Mikhaylov and V. M.Chulanovskiy, made valuable suggestions. T. A. Karpov

Card 2/3

SOV/57-2-3-3-19/33

Investigation of Some Properties of Gamma-Irradiated Polyethylene

and V. A. Kozlov made available the samples. There are 3
figures, 1 table, and 19 references, 1o of which are Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy institut polimerizatsionnykh plast-
mass. Institut vysokomolekulyarnykh soyedineniy AN SSSR
(Scientific Research Institute of Polymerized Plastics. Institute
of High-Molecular Compounds, AS USSR, Leningrad)

SUBMITTED: November 29, 1957

Card 3/3

MIKHAYLOV, G.P.; SAZHIN, B.I.

Study of the dielectric losses and dielectric permittivity of
crystallizing polymers. Vysokom.soed. 1 no.1:9-16 Ja '59.
                                                    (MIRA 12:9)

1. Leningradskiy politekhnicheskiy institut im. M.I.Kalinina.
              (Polymers--Electric properties)

MIKHAYLOV, G.P.; SAZHIN, B.I.

Study of the effect of polymer crystallization on dielectric
losses. Vysokom.soed. 1 no.1:29-35 Ja '59.   (MIRA 12:9)

1. Leningradskiy politekhnicheskiy institut im. M.I.Kalinina.
(Crystallization) (Polymers--Electric properties)

SAZHIN, B.I.; SKURIKHINA, V.S.; IL'IN, Yu.A.

Dielectric losses and ultrasonic wave absorption in polypropylene.
Vysokom. soed. 1 no.9:1383-1389 S '59.   (MIRA 13:3)

1.Nauchno-issledovatel'skiy institut polimerizatsionnykh plastmass.
              (Propene)

SOV/28-59-12-6/27

28(5)

AUTHOR: Shcherbak, P.N., and Sazhin, B.I.

TITLE: Problems of the Standardization of Electrical Test
            Methods for Plastics

PERIODICAL: Standartizatsiya, 1959, Nr 12, pp 32-35 (USSR)

ABSTRACT: To satisfy the constantly growing needs for plastics
            in various branches of the national economy, as for
            instance in the field of electric insulation, the
            current 7 Year Plan foresees an eight-fold production
            increase of some polymers. The existing methods to
            determine the electric characteristics of dielectrics,
            as for instance developed by the Vsesoyuznyy elektro-
            tekhnicheskiy institut im. V.I. Lenina (All-Union Elec-
            troengineering Institute imeni V.I. Lenin), do not
            meet the requirements. Recently, the Fizicheskiy in-
            stitut im. Lebedeva AN SSSR (Physics Institute imeni
            Lebedev of the AS USSR) and the Institut vysokomolek-
            ulyarnykh soyedineniy AN SSSR (Institute for High Mole-

Card 1/3

SOV/28-59-12-6/27

Problems of the Standardization of Electrical Test Methods for
Plastics

cular Compounds of the AS USSR) have developed testing
methods based on the application of coaxial cavities.
$\overline{/}$Ref 2$\overline{/}$ The authors stress the deficiency of the
existing standards for testing dielectrics and recommend
the introduction of US methods in the conditioning of
plastics and electric insulation materials. It has be-
come necessary to work out standards for measuring
the basic electric characteristics within the follow-
ing range and under the following conditions: speci-
fic electric resistance volume (surface) up to 10^{18} -
10^{19} ohm.cm (ohm); a specific inductive capacitance
and tg δ in the frequency range of $50-10^9$ cycles with
a permissible error of tg δ for higher grade dielec-
trics not exceeding $\pm$ 0.00005; the electric strength
not only at commercial frequency, but also on direct
current in high-frequency fields and pulsation currents.

Card 2/3

SOV/28-59-12-6/27

Problems of the Standardization of Electrical Test Methods for Plastics

The serial production of appropriate apparatus should be organized. There are 3 references, of which 2 are American, and 1 Soviet.

Card 3/3

ANDREYEVA, I.N.; ARKHIPOVA, Z.V.; VESELOVSKAYA, Ye.V.; LEVINA, A.A.;
ANTOKOL'SKAYA, Ye.M.; LAZAREVA, N.P.; SAZHIN, B.I.; KHIN'KIS,
S.S.; SHCHERBAK, P.N.; GERBIL'SKIY, I.S.; LYANDZBERG, G.Ya.;
PARAMOHKOVA, T.V.; PECHENKIN, A.L.; YEGOROV, N.M., red.;
SHUR, Ye.I., red.; FOMKINA, T.A., tekhn.red.

[Low-pressure polyethylene] Polietilen nizkogo davleniia.
Izd.2., ispr. i dop. Leningrad, Gos.nauchno-tekhn.izd-vo
khim.lit-ry, 1960. 95 p. (MIRA 14:1)

1. Nauchno-issledovatel'skiy institut polimerizatsionnykh plast-
mass (for all, except Yegorov, Shur, Fomkina).
(Polyethylene)

87487

S/191/60/000/001/002/015
B016/B054

24.7700

AUTHOR: Sazhin, B. I.

TITLE: Electrical Properties of Low-pressure Polyethylene

PERIODICAL: Plasticheskiye massy, 1960, No. 1, pp. 9-12

TEXT: The author reports on the effect of the degree of elution of catalyst residues from low-pressure polyethylene (LPP) on tan δ of the dielectric losses, and on the electrical volume resistivity ρ_v. tan δ and dielectric constant ε were measured by the following instruments: МДП (MDP) and МЛE-1 (MLYe-1) bridges, KB-1 (KV-1) quality factor measuring instrument, ИД-1 (ID-1) and 36И (36I) dielectric measuring instruments. The methods of determining the changes of ε and tan δ had been described earlier (Ref. 2). The volume resistivity ρ_v was measured by a string electrometer in a compensation circuit. Samples were pressed at 160°C and 250 kg/cm^2. An aluminum foil was incorporated to serve as electrode. The samples were measured after annealing and 8 h of drying at 100°C. The author compares

Card 1/2

87487

Electrical Properties of Low-pressure   S/191/60/000/001/002/015
Polyethylene   B016/B054

LPP with high-pressure polyethylenes (HPP), and on the basis of experi-
mental results (Figs. 1-5) arrives at the following conclusions: 1) The
value of the dielectric constant of polyethylenes is determined by the
density, and is independent of the frequency in the range of
10^0-10^{10} cycles. In polyethylenes with $\rho = 0.94 - 0.96$ g/cm^3, $\varepsilon = 2.30$-2.40.
2) The tan δ of LPP is 0.0001 - 0,0004, and increases with the oxidation
of the polymer and with the amount of non-eluted catalyst residues. The ab-
sence of losses of medium-frequency relaxation can be explained by the
poor branching of LPP molecules. The electrical volume resistivity of LPP
is 10^{17} - 10^{18} ohm·cm at 20 - 25°C, and increases with increasing ash
content. The author thanks I. N. Andreyeva for her assistance in the in-
vestigation and discussion, Ye. M. Antokol'skaya for preparing the
samples, and N. S. Kolidorova and N. N. Kirillova for their assistance in
making measurements. There are 5 figures and 8 references: 4 Soviet,
1 British, and 3 US.

Card 2/2

AUTHORS: Sazhin, B. I. and Skurikhina, V. S.

TITLE: Investigation of the Electrical Conductivity of Polymers.
                I. Methods of Measuring the Volume Resistivity of the Order
                of $10^{17} - 10^{19}$ ohm·cm

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 10,
                pp. 1535-1540

TEXT: The authors studied the effects of the design of the specimen, of
the gap h between the measuring electrode and the shield ring, and of the
preliminary treatment of the specimens on the measurement of the currents
that are very weak at a volume resistivity of $10^{17} - 10^{19}$ ohm·cm. The
current was measured by means of B. M. Dokukin's tube electrometer with
recording on the band of an ЭПП-09 (EPP-09) electronic potentiometer.
High-pressure polyethylene, low-pressure polyethylene, polystyrene, and
CH-28 (SN-28) styrene-acrylonitrile copolymer were used as specimens.
The electrodes were either arranged in the usual manner, or a special
design was used with a high-pressure polyethylene film pressed onto the
measuring electrode (Fig. 1). The course of the charging and discharging

Card 1/2

Investigation of the Electrical Conductivity of   S/190/60/002/010/014/026
Polymers. I. Methods of Measuring the Volume   B004/B054
Resistivity of the Order of 10^{17} - 10^{19} ohm·cm

current with respect to time was measured for various h. Fig. 2 shows
log i = φ(log τ). The linear course of this function proved that the
Curie equation holds for the polymers investigated. With increasing h, the
current intensity increases due to polarization processes. Fig. 3 com-
pares the function log ϱ_v = f(log τ) (ϱ_v = volume resistivity) for low-

pressure polyethylene with a normal arrangement of electrodes and that ob-
tained with the use of the special design. At h = 0.5 mm, the values were
in agreement so that the usual design can be used. At h > 0.5, too low
ϱ_v values are obtained with the usual design. Fig. 4 shows log ϱ_v=f(log τ)

for polystyrene and polyethylene measured on electrodes lapped with lubri-
cants (transformer oil, condenser Vaseline, silicon oil). Here, a reduc-
tion of the measured ϱ_v occured. An additional annealing of the specimens,
and the electrode metal, however, had no influence on the measured values.
The authors thank L. I. Kolotsey for his assistance. There are 5 figures
and 4 references: 3 Soviet, 1 British, and 3 German.
ASSOCIATION: Nauchno-issledovatel'skiy institut polimerizatsionnykh
               plastmass (Scientific Research Institute of Polymerization
               Plastics)
SUBMITTED: May 23, 1960
Card 2/2

S/190/60/002/010/015/026
B004/B054

AUTHORS: Sazhin, B. I. and Stafeyeva, N. P.

TITLE: Investigation of the Electrical Conductivity of Polymers.
                II. Polytrifluoro-chloro Ethylene

PERIODICAL: Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 10,
                pp. 1541-1547

TEXT: The authors aimed at obtaining more data on the electrical conduc-
tivity of Φ-3 (F-3) polytrifluoro-chloro ethylene. Silver electrodes were
sprayed in vacuo on the specimens pressed at 150 kg/cm^2 and 250°C. The
volume resistivity ϱ_v between 15 and 230°C was determined. The currents
were recorded by a tube electrometer on the band of an ЭПП-09 (EPP-09)
potentiometer. Fig. 1 shows log i = f(log t) and log ϱ_v = f(log t). The
Curie equation i = $i_o \tau^{-n}$ (i_o and n are constants) holds for F-3. ϱ_v is
dependent on τ. In the function log ϱ_v = f(1/T), the curve shows a salient
point near the vitrification temperature T_v (Fig. 2). At T < T_v, ϱ_v main-
ly depends on the polarization current, at T > T_v, on the translational

Card 1/2

Investigation of the Electrical Conductivity   S/190/60/002/010/015/026
of Polymers. II. Polytrifluoro-chloro   B004/B054
Ethylene

conductivity. The latter is reduced by "electropurification" by means of
the passage of an amount of electricity $Q = 2.6 \cdot 10^{-3}$ coulombs. Electro-
purification increases with rising voltage at constant temperature (Fig.4).
From the measurement of the imaginary part ε'' of the dielectric constant,
of the exponent n of the Curie equation, and of the log Q_d (Q_d = amount
of discharged electricity) as a function of temperature in the alternating-
current field (Fig. 5) the authors conclude that in F-3 there occurs a
dipole-radical polarization ($T < T_v$), a dipole-elastic polarization ($T > T_v$),
and a motion of dipoles in the crystalline phase. The authors thank
V. M. Marakhonov for his assistance. There are 5 figures and 11 references:
4 Soviet, 2 US, 1 British, and 4 German.

ASSOCIATION: Nauchno-issledovatel'skiy institut polimerizatsionnykh
               plastmass (Scientific Research Institute of Polymerization
               Plastics)

SUBMITTED: May 23, 1960

Card 2/2

28 (5)   S/032/60/026/01/027/052
AUTHORS: Shcherbak, P. N., Sazhin, B. I.   B010/B009

TITLE: On the Investigation Methods of the Electrical Strength and
                Specific Resistance of Plastics

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol 26, Nr 1, pp 79 - 81 (USSR)

ABSTRACT: The authors explain the methods used at present for the deter-
                mination of the electrical strength E and specific resistance
                (volume resistivity ρ_v, surface resistivity ρ_s, and internal
                resistivity) of plastics and make some suggestions for the im-
                provement of the relevant GOST standards. The pretreating con-
                ditions for the samples laid down in GOST 6433-52 have to be
                made more precise, as has been done in ASTM D-618 and E-104.
                The value ρ_v is determined according to GOST 6433-52 up to
                10^{14} ohm·cm. The range of measurement may, however, be extended
                to 10^{16} ohm·cm, if the more sensitive galvanometers of the types
                M107/1 (Ref 6) and M21 are used and some modifications are car-
                ried out. For the determination of higher resistivities a num-
                ber of electrometers (Ref 9) as well as tera-ohmmeters (Ref 10)
Card 1/3   have been developed. The TO-2 tera-ohmmeter permits measurements

On the Investigation Methods of the Electrical   S/032/60/026/01/027/052
Strength and Specific Resistance of Plastics   B010/B009

between 10^{12} and 10^{16} ohms, the more sensitive F-57 tera-ohm-
meter up to $2 \cdot 10^{17}$ ohm·cm. Since electrometers are not produced
serially, some instruments were tested in the NIIPP and it was
found that further improvements are necessary for measurements
up to 10^{18} ohm·cm. It is pointed out that determinations of ϱ_v
by means of the method of spontaneous discharge and the method
recommended by GOST 6433-52 need not yield identical results.
On account of the suspension of the standard GOST 1410-42 in
1957 there is at present no standard method available for the
investigation of plastic coatings by breakdown tests by a pulsed
current. This method must, however, of necessity be standardized.
The use of electrostatic voltmeters of the types S-95 (up to
3 kv) and S-96 (7.5, 15, and 30 kv) for high-voltage investiga-
tions permits an improvement in the measuring accuracy. For
breakdown tests of thin samples the instruments of the types
AMI-60 (60 kv alternating current) as well as AKI-50 (direct
current up to 50 kv) designed for the investigation of oils
may be used. The standard OST-5053 for the investigation of

Card 2/3

On the Investigation Methods of the Electrical   S/032/60/026/01/027/052
Strength and Specific Resistance of Plastics   B010/B009

the electric arc resistance of plastics has been suspended,
but a new one has not yet been published. The existing stan-
dards mentioned above are thus insufficient. They will have
to be developed for measurements up to $10^{18} - 10^{19}$ ohm·cm.
In connection with this standardization the respective instru-
ments will have to be produced serially. There are 26 ref-
erences, 18 of which are Soviet.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy institut
polimerizatsionnykh plastmass (State Scientific Research
Institute of Polymerization Plastics). Eksperimental'nyy
zavod (Experimenting Plant)

Card 3/3

24.2400
~~28(5)~~

68287

AUTHORS: Sazhin, B. I., Shcherbak, P. N.

S/032/60/026/02/028/057
B010/B009

TITLE: Modern Methods for Testing the Dielectricity Constants and
                  the Tangent of the Dielectric Loss Angle of Plastics 15

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol 26, Nr 2, pp 188 - 192
                  (USSR)

ABSTRACT: In connection with the rapid development of the plastic di-
                  electric production envisaged in the Seven-year Plan it has
                  been necessary also to establish satisfactory methods for
                  testing the dielectricity constant ε and the tangent $\mathrm{tg}\,\delta$ of
                  the dielectric loss angle. A table gives a survey of the
                  various possibilities of arranging the electrodes and samples,
                  as well as of the formulas for determining ε. Then various de-
                  tails to be borne in mind during the tests as well as correc-
                  tions are mentioned, and data from the ASTM D150-54T standard
                  are cited. When using flat samples with guard rings a correc-
                  tion must be made in GOST 6433-52 (in accordance with the
                  ASTM D150 standard) with regard to the effective surface of
                  the measuring electrode. When determining the sample capacity
Card 1/3   the electrode and wire capacities must frequently be taken

68287

Modern Methods for Testing the Dielectricity   S/032/60/026/02/028/057
Constants and the Tangent of the Dielectric Loss   B010/B009
Angle of Plastics

into consideration. For this purpose it is recommended to
calibrate with samples of a material with a known dielectri-
city constant (e.g. polyethylene). More attention must be
directed in Soviet standards to edge correction. In tests
with frequencies above 10^7 cycles per second it is absolutely
necessary to make corrections with regard to induction. In
determining tgδ the capacity, inductivity, and resistance of
the wires must also be taken into consideration. Measurements
under operating conditions (frequency 50-60 cycles per second)
are carried out, according to GOST and ASTM, with a high volt-
age Schering bridge. For measurements of ε and tgδ according
to OST 40071 balanced bridges are used with sound frequencies
of 500-1000 cycles per second, but these bridges are not

manufactured. For frequencies of 10^2 - 10^4 cycles per second
low voltage Schering bridges such as the MLE-1 bridge may be
used. According to the GOST project (Ref 11) ε and tgδ may be
measured at 10^6 cycles per second either by means of a KV-1
Q-meter and loss gauge or by a KV-1 Q-meter according to the

Card 2/3

68287

Modern Methods for Testing the Dielectricity Constants S/032/60/026/02/028/057
and the Tangent of the Dielectric Loss Angle of Plastics B010/B009

substitution method. Measurements according to the resonance
method may be made at $10^5 - 10^8$ cycles per second with micro-
metric electrodes (Fig) and GSS-6 or GSS-17 generators and
wavemeters of type 526. In this case 28IM measuring amplifiers
may be used. In the case of high-precision measurements of ε
and tgδ at -100 to +200° and frequencies of $50 \cdot 10^7$ cycles per
second, such as are described in reference 13, a GSS-12 ge-
nerator, RVD wavemeter, A8-1 step attenuator and 28IM measuring
amplifier may be used. The existing measuring methods for ε
and tgδ are insufficient, and it will be necessary to develop
testing methods for $50 \cdot 10^9$ cycles per second with a maximum
error of tgδ determination of ± 0.00005. There are 1 figure,
1 table, and 13 references, 7 of which are Soviet.

Card 3/3

SAZHIN, B.I.

pa

5.4600
5.3831

AUTHORS: Mikhaylov, G. P., Sazhin, B. I.

TITLE: High-molecular Dielectrics

PERIODICAL: Uspekhi khimii, 1960, Vol. 29, No. 7, pp. 864-881

TEXT: The aim of the authors was to illustrate some laws governing the
electric properties of polymers on the basis of own results and those
published by other research workers. Attention is devoted chiefly to
dielectric losses and polarization studied in dependence on the structure
of high-molecular compounds with respect to chemical composition,
stereochemical structure, amorphous and crystalline states, and also to
the character of thermal motion, since the electric properties of the
polymer are largely dependent on the last-mentioned characteristic.
In the chapter dealing with dielectric losses and polymerization of
non-polar polymers, the dependence of the dielectric constant ε', the
square of the refractive index n_D^2, and the dielectric loss angle $\tan\delta$
on temperature and frequency (Fig. 1) for amorphous polystyrene, the

Card 1/4

81975

High-molecular Dielectrics

S/074/60/029/07/03/004
B020/B068

temperature dependence of ε' and $\tan\delta$ for atactic and isotactic polystyrenes (Fig. 2), of ε' and $\tan\delta$ for low- and high-density polyethylenes and polytetrafluoroethylene $\Phi-4$ (F-4) (Fig. 3), the dependence of $\tan\delta$ of high-and low-density polyethylenes on the concentration of the strongly polar $C=0$ groups (Fig. 4), the temperature dependence of $\tan\delta$ for polypropylene (Fig. 5) and poly-ethylenes at 3.10^9 cps are graphically shown. In Table 1, densities of non-polar polymers, their measured ε'-values as well as values of molecular polarization calculated from these densities and the refractions of bonds are given. The last column of this Table shows differences found between the experimentally determined and calculated polarization and refraction values. In the chapter dealing with dielectric losses and dielectric constants of polar polymers, the temperature dependence of ε' and $\tan\delta$ for polyparachlorostyrene (PPCS), polyvinyl chloride (PVC), polymonofluorotrichloroethylene ($\Phi-3$(F-3)) (Fig. 7), and three crystalline polyesters (Fig. 8), of $\tan\delta$ for styrene - methylmethacrylate and styrene - methylacrylate copolymers

Card 2/4

High-molecular Dielectrics

81975

S/074/60/029/07/03/004
B020/B068

(Fig. 9), the frequency dependence of $\tan\delta$ for styrene - methyl-
methacrylate copolymers (Fig. 10), the temperature dependence for
acrylonitrile - butadiene (26:74) and acrylonitrile - styrene (28:72)
copolymers, of the relative volume changes for styrene - methyl-
methacrylate copolymers (Fig. 12), of ε' and $\tan\delta$ for a polystyrene -
benzylbenzoate mixture (Fig. 13), of $\tan\delta$ for a mixture of grafted
polymers and homopolymers of acetobutyrate cellulose with polymethyl-
methacrylate (Fig. 14), for polyethyleneterephthalate with nylon
(Fig. 15), and the dependence of the logarithm of frequency of
maximum $\tan\delta$ for dipole-elastic and dipole-radical losses on $1/T$
(Fig. 16) are graphically shown. In the chapter dealing with electrical
conductivity and breakdown of polymers, the time dependence of the
logarithm of the current flowing through the polymer with $U = const$
(Fig. 17), the temperature dependence of volume resistivity of PVC
plasticized with 4.5% dioctyphthalate (Fig. 18), the dependence of the
logarithm of volume resistivity of low-density polyethylene on $1/T$
(Fig. 19), the dependence of $\log\varrho_{vol} = \varphi(1/T)$ for polyvinyl acetate,
polyvinyl butyral, polyvinyl formal, polymethylmethacrylate, polyvinyl

Card 3/4

High-molecular Dielectrics

81975

S/074/60/029/07/03/004
B020/B068

ethylal, and polystyrene (Fig. 20), the dependence of the electrical
conductivity of polyethylene and polymethylmethacrylate on $1/T$ (Fig. 21),
and the temperature dependence of the electrical conductivity of
polyvinyl alcohol, polymethylmethacrylate, polyvinylchloroacetate,
chlorinated high-density polyethylene, mica, polystyrene, high-density
polyethylene, and polyisobutylene (Fig. 22) are graphically studied.
A. F. Ioffe is mentioned. There are 22 figures, 2 tables, and 46
references: 26 Soviet, 12 US, 6 British and 2 German.

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy Akademii nauk
SSSR (Institute of High-molecular Compounds of the
Academy of Sciences, USSR). Nauchno-issledovatel'skiy
institut polimerizatsionnykh plastmass, Leningrad
(Scientific Research Institute of Polymer Plastics,
Leningrad)

Card 4/4

22736

S/191/61/000/006/001/005
B101/B215

9,4300 (1136,1145,1155)

AUTHOR: Sazhin, B. I.

TITLE: Temperature dependence of the electrical conductivity of
            polymers

PERIODICAL: Plasticheskiye massy, no. 6, 1961, 4-8

TEXT: This paper deals with the change of the volume resistivity ϱ_v of

polymers as a function of the duration τ of the flow of current. Commer-
cial grade samples of polystyrene (PS), polymonochlorostyrene (PMCS), a
copolymer consisting of 70% of styrene + 30% of α-methylstyrene (SM), and
a copolymer consisting of 72% of styrene + 28% of acrylonitrile (SN-28)
were studied. Disk-shaped specimens (50 mm in diameter, thickness of
1-2 mm) were obtained by pressing at 160-180°C. Silver thermally sprayed
onto the specimens in vacuo or aluminum foil (0.0055 mm thick) pressed on
at 160-180°C served as electrodes. The material of the electrode and heat-
ing of the specimens before measuring did not affect ϱ_v. For measuring the
currents i $> 10^{-13}$a a Φ-57 (F-57) tregohmmeter was used. The current

Card 1/5

22736

S/191/61/000/006/001/005
B101/B215

Temperature dependence of the ...

strength as a function of τ was recorded by an ЭПП-09 (EPP-09) electron potentiometer. Dry-cell batteries, 95-650 v, were used as current sources. For temperatures between 20° and 80°C, a thermostat through which hot air flowed was used, and an automatically controlled electric furnace for higher temperatures. Before measuring, the specimens were heated at the temperature of examination T (20-180°C) for 30 min. The duration τ of the flow of current was varied within 17-1200 sec. The following results were obtained: 1) The function $\log i = \varphi(\log \tau)$ is a straigth line following the Curie equation $i = i_o \tau^{-n}$, where i_o and n are constants. At low temperatures (27°C), the charge current i_{ch} and the discharge current i_d are equal; at higher temperatures (75°C), from $\tau = 100$ sec onward, i_{ch} is reduced more slowly than i_d. With $\tau < 100$ sec, ϱ_v depends on polarization processes, and with $\tau > 100$ sec it depends on the conductivity. At temperatures still higher (128-170°C), i_{ch} increases considerably and becomes less and less dependent on τ. Within this temperature range, i_d is much smaller

Card 2/5

22736

S/191/61/000/006/001/005
B101/B215

Temperature dependence of the ...

than i_{ch}. 2) The function $\log \varrho_v = f(i/T)$ has three sections: I) $T < T_v$ (vitrification temperature): In this temperature range, ϱ_v of PS, PMCS, SN, and SN-28 increases quickly as τ increases. Here, ϱ_v mainly depends on polarization processes. II) $T \sim T_v$: In this range, ϱ_v of PS, PMCS, and SN-28 ($\tau = 17$ sec) depends on the dipole polarization. In these substances, ϱ_v reaches its minimum near T_v. SM shows no minimum since its electrical conductivity is higher than the conductivity caused by polarization. III) Within the temperature range of $T > T_v$, ϱ_v only depends on the conductivity. 3) $\varepsilon' = 1.8 \cdot 10^{13} \tau/\varrho_v$ (2) was also measured. Experimental data are given in a table. The author thanks N. F. Usmanova and R. A. Gorodetskaya for the specimens, L. I. Kolotsey and V. M. Marakhonov for assistance. There are 3 figures, 1 table, and 11 references: 7 Soviet-bloc and 4 non-Soviet-bloc. The most important reference to English-language publicationsreads as follows: R. J. Munick, J. Appl. Phys., 27, 1114 (1956).

Card 3/5

22736

Temperature dependence of the ...

S/191/61/000/006/001/005
B101/B215

Table. Data of electrical and other properties of PS, PMCS, and SN-28.

Legend: 1) Polymer; 2) position of regions I, II, III; a) region; 3) τ, sec; 4) calculated from Eq. (2); 5) calculated according to K. Z. Fattakhov, ZhTF, 22, 313 (1952) and G. P. Mikhaylov, B. I. Sazhin, Uspekhi khimii, 39, 864, (1960); 6) ϱ_v ohm.cm, at 20°C; τ = 60 sec; 7) PS; 8) PMCS; 9) SN-28;

$T_{CT} = T_v$.

(1) Полимер	$T_{ст}$, °C	Положение областей I, II и III (2) C°		
		область I	область II	область III
(7) Полистирол	80—85	$T<65$	65—100	$T>100$
(8) Полимонохлорстирол .	130—137	$T<85$	85—140	$T>140$
(9) Сополимер стирола и акрилонитрила 72—28	98—105	$T<70$	70—105	$T>105$

Card 4/5

24.2400   28985
15-8540   S/191/61/000/011/001/008
                                                B110/B147

AUTHORS: Sazhin, B. I., Malkevich, S. G., Chereshkevich, I. V.,
                Dmitriyeva, N. S.

TITLE: Study of dielectric losses and penetrability of fluoroplasts

PERIODICAL: Plasticheskiye massy, no. 11, 1961, 3-5

TEXT: The effect of the composition of copolymers of tetra- (I) and
trifluoro ethylene (II) on ε and $\tan\delta$ is investigated. Polytrifluoro
ethylene (III), $[CF_2-CFH]_n$, has a great dipole moment and, at room
temperature and low frequencies, a dielectric penetrability of 12.5.
Since ε of polytetrafluoro ethylene (IV) is only 2.0-2.1, the authors
tried to increase ε by copolymerization of I with II, and of I with II
and hexafluoro propylene (V) (Table 1). ε and $\tan\delta$ were determined
according to B. I. Sazhin, P. N. Shcherbak (Ref. 2: Zav. lab., no. 2
(1960)). The dependence of ε and $\tan\delta$ on the concentration of (II) was
calculated by the dielectric polarization theory (Ref. 6: see below).
According to this, the interaction of polar groups belonging to one chain

Card 1/4

Study of dielectric losses and...   28985 S/191/61/000/011/001/008
                                             B110/B142

may be estimated. According to Ref. 6, it holds for low frequencies:

$$\frac{(2\varepsilon + 1)(\varepsilon - n_D^2)}{3\varepsilon(n_D^2 + 2)} = \frac{4\pi}{3} n \frac{\mu_{\ni\phi}^2}{3KT} \qquad (1)$$

Here, n - number of polar monomer groups in 1 cm³; $\mu_{\ni\phi} = \mu_{ef}$ - effective dipole moment of these groups; $K = 1.638 \cdot 10^{-16}$ erg/degree; T - absolute temperature. For calculating ε, it is necessary to know n_D^2, n, and $\mu_{\ni\phi}$. μ_{ef} was determined (a) from ε of III and found to be $1.11 \cdot 10^{-18}$, and (b) from ε of the copolymer containing 3.5 % of II. In the latter case it amounted to $1.41 \cdot 10^{-18}$ cgs units. In $\varepsilon = A/2 + \sqrt{(A^2/4) + (n_D^2/2)}$ (2), $A = (n_D^2 - 5) + 10^{14} \cdot \mu_{ef}^2 \cdot n$ (obtained from Eq. (1) at $T = 293^\circ C$). The theoretical concentration dependence of the ε values of copolymers takes a straight course for 0-25 mole% of II. For a content of II $\leqslant 5$ %, μ_{ef} is to be calculated according to b. Deviations of the experimental

Card 2/6

28985
S/191/61/000/011/001/008
B110/B147

Study of dielectric losses and...

ε values from those calculated from Eqs. (1) and (2) are 10-20 %. The following holds according to Ref. 3 (see below): $\tan\delta_{max} = \alpha(\varepsilon - n_D^2)/2\varepsilon$ (3), where ε - dielectric penetrability; α a parameter characterizing the width of the maximum of $\tan\delta$ as a function of frequency. It is found experimentally and amounts to 0.2-0.8, at temperatures above the vitrification point. The values of $\tan\delta_{max}$ are given in Table 2. Addition of 1 % of II to I does not alter ε, but increases $\tan\delta_{max}$ from 0.0002 to 0.006-0.020. For a ternary copolymer with 4 % of II, $\tan\delta_{max}$ was found to be 0.02-0.04 ($\alpha = 0.2$ or 0.4), which proved the validity of the theory. In the range distant from $\tan\delta_{max}$, the increase of $\tan\delta$ with increasing concentration of II is lower. The increase of ε achieved by copolymerization of polar and nonpolar monomers is always accompanied by a ten- and hundred-fold increase of $\tan\delta$. There are 2 figures, 2 tables, and 9 references: 5 Soviet and 4 non-Soviet. The four references to English-language publications read as follows: Ref. 1: E. Yelton, Trans. Electrochem. Soc., 90, 331 (1947); Ref. 3: R. Fuoss, J. Kirkwood, J. Am. Chem. Soc.,

Card 3/6

28985
S/19?/61/000/011/001/008
Study of dielectric losses and...   B110/B147

63, 385 (1941); Ref. 6: F. E. Harris, B. J. Alder, J. Chem. Phys., 21,
1031 (1953); Ref. 9: McCrum, Makromol. Chem., 35, (1960).

Table 1. Values of density, square refractive index, ι, and tanδ of some
copolymers. Legend: (1) Copolymer. (2) Content of II, mole%. (3)
Abbreviated designation. (4) $d_{20^\circ C}$, g/cm^3. (5) n_D^2 at 20°C. (6) ϵ at 20°C
and 10^3 cps. (7) tanδ at 20°C and 10^6 cps. (8) Tetrafluoro ethylene - tri-
fluoro ethylene. (9) Tetrafluoro ethylene - hexafluoro propylene - trifluoro
ethylene.

Table 2. Values of tanδ_{max} in the range of maximum losses calculated by
equation (3). Legend: (1) Molar concentration of II, mole%. (2) I-II.
(3) I-V-II.

Card 4/6

21136

15·8560   2209,1372, also 1043, 1477

S/190/61/003/004/011/014
B101/B207

AUTHORS: Kabin, S. P., Malkevich, S. G., Mikhaylov, G. P., Sazhin, B. I.
Smolyanskiy, A. L., Chereshkevich, L. V.

TITLE: Study of the dielectric losses and polarization of some fluoro-plasts

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 4, 1961, 618-623

TEXT: This paper studies the effect of crystallization upon the dielectric constant ε and tan δ of the dielectric losses. Substances with the following parameters were studied:

Substance:	Denotation	d_{200}, g/cm^3	ε, 10^5 cps, 0°C	tan δ, 10^5 cps, 0°C	melting point, °C
polyvinylidene fluoride	F-2	1.86	7.0	0.19	180
copolymer from tetra-fluoroethylene and fluorovinylidene 1:4	CF-1	1.86	6.4	0.18	145

Card 1/7

21136

S/190/61/003/004/011/014
B101/B207

Study of ...

Substance:	Denotation	d_{20^o}, g/cm^3	ε, 10^5 cps, 0°C	tan δ, 10^5 cps, 0°C	melting point, °C
ditto, ratio 1:2	CF-2	1.91	8.6	0.09	160
ditto, ratio 1:1	CF-3	1.98	8.0	0.08	205

ε and tan δ were measured between -150°C and melting point of the polymer at frequencies of 5-10^7 cps on 0.1-0.5 mm thick samples according to a method described in Ref. 4 (G. P. Mikhaylov, B. I. Sazhin, Vysokomolek. soyed., 1, 9, 1959; Zh. tekhn. fiz., 25, 2186, 1955). The maximum error was less than 10%. Fig. 1 shows ε and tan δ as a function of temperature. The maxima occurring therein which are caused by relaxation, were also observed when tan δ was a function of frequency. Since tetrafluoroethylene has a symmetrical molecule with small dipole moment, the increase of ε and tan δ in the copolymers, is due to the polarity of vinylidene fluoride. Three ranges of dielectric losses owing to relaxation were observed. 1) high-frequency relaxation at CF-2 and CF-3 in the range of from -180- -100°C

Card 2/7

21136

S/190/61/003/004/011/014
B101/B207

Study of ...

(maximum of tan δ); 2) medium-frequency relaxation in all substances investi-
gated in the range of from -50- +50°C, and 3) low-frequency relaxation at
+100- +200°C in all substances. Experiments carried out with hardened CF-3
showed a falling of high-frequency relaxation and a rise of middle-frequency
relaxation as compared to the non-hardened polymer. Fig. 4 shows the
frequency of the maximum of high-frequency and medium-frequency relaxation
as a function of $1/T$. The discussion of the experimental data led to the
following conclusions: 1) The dielectric properties in the range of from
100-200°C cannot be explained by relaxation only. The structural transforma-
tions must also be taken into account. 2) The maxima of low-frequency re-
laxation lie close to the melting point of the polymers concerned, thus due
to thermal motions in the crystalline phase. 3) The dielectric losses de-
crease with the degree of crystallization of the copolymers. 4) Orientation
of polymers, i.e., increase of the degree of crystallization, may be ac-
companied by a considerable increase of ε. There are 4 figures, 1 table,
and 11 references: 8 Soviet-bloc and 4 non-Soviet-bloc. The 2 references
to English-language publications read as follows: M. E. Convoy et al.,
Rubb. Age, 76, 543, 1955; A. H. Willbourn, Trans. Faraday Soc., 54, 717,
1958.

Card 3/4

\\5.8500   also 1136, 1138

AUTHORS: Sazhin, B. I., Eydel'nant, M. P.

TITLE: Study of the electrical conductivity of polymers IV.
              Influence of dipole polarization (polystyrene, poly-p-chloro-
              styrene, copolymer from styrene and acrylo-nitrile)

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 5, 1961, 761-767

TEXT: Recently, one uses increasingly measurements of electrical conduc-
tivity for investigating the dipole polarization of polymers, since in the
range of the polarization phenomena the specific volume resistance ρ_v de-
pends on the time of stress and on the temperature. The phenomenological
theory (Ref. 2: B. V. Hamon, Proc. Instn. electr. Engr., 99, IV, 151, 1952)
expresses the relation of ρ_v measured at the moment τ (the frequency of the
alternating field being $0.1/\tau$) to the dielectric factor of loss ε''. In
order to ascertain the applicability of this theory for polymers, the
ε''-values thus obtained from the frequency f (range from 10 to 10^{-5} cps)
and ρ_v are compared with the experimental results. The authors studied

Card 1/10

22568

S/190/61/003/005/011/014
B110/B220

Study of the electrical...

the influence of dipole polarization on the conductivity of polystyrene (PS), poly-p-chlorostyrene (PPCS), and the styrene copolymer of acrylo-nitrile (ratio = 72 : 28) CH-28 (SN-28) as well as the applicability of the phenomenological theory for the determination of ε'' at low frequencies from data obtained with direct current. Technically pure specimens of PS, PPCS, and SN-28 (disks of 0.5 to 2 mm thickness and 50 to 100 mm radius) were pressed at a temperature surpassing the vitrification temperature T_v by 80°C. Al foils of 0.055 mm thickness pressed-on to the specimens served as electrodes. The specimen was heated to T_v + 30°C. The following

instruments were used for measuring the dielectric constant (ε) and the dielectric loss (tan δ): 1) at 50 cps, the high-voltage bridge P-525 (R-525); 2) from 400 to 10^4 cps, the MJE-1 (MLYe-1) bridge; 3) from $6 \cdot 10^4$ to $1.5 \cdot 10^6$ cps, the KB-1 (KV-1) cps-coulometer. The charge currents were measured at τ = 10 to 1200 sec based on the method described in Ref. 3 (B. I. Sazhin et al.: Vysokomolek. soyed., 2, 1535, 1960). For measurements from 10 msec to 10 sec, the circuit of Fig. 1 was used. The relay P and a special oscilloscope (ИПО-2) (MPO-2) type IX synchronized the power supply

Card 2/10

22568

S/190/61/003/005/011/014
B110/B220

Study of the electrical...

to the specimen and the current recording. The total sensitivity amounted to $3.6 \cdot 10^{-3}$, the current sensitivity to $3.6 \cdot 10^{-3}/R_{st}$, where R_{st} is the standard resistance of the tregohmmeter MOM-4 (MOM-4) charging the specimen, which has been determined according to $\tau \geqslant 100 \ nP_{st}C/P$. n is the exponent of the Curie formula: $i = i_0 \tau^{-n}$; P = limit of error, %; τ = duration of reading; C = sample capacitance and apparatus entrance capacitance. The values for ε'' at frequency f were determined as follows: $\varepsilon'' = 1.8 \cdot 10^{12} \tau / \rho_v \cdot C$. Fig. 2 shows log ρ_v = F(1/T) for PS, PPCS, and SN-28 at a duration of application of voltage of 0.01 to 1200 sec. Three different curve sections were found: at relatively low temperatures ρ_v rises steeply with increasing τ and decreases slightly with increasing temperature (section I); (near T_v) ρ_v is dependent on τ and passes a minimum, when the temperature rises (section II); at higher temperatures ρ_v is much more dependent on the tempera-

Card 3/10

22568

S/190/61/003/005/011/014
B110/B220

Study of the electrical...

ture than in section I, but independent of τ (section III). Analogous conditions hold for polyvinyl acetate, poly-tri-fluoro chloro ethylene and polyvinyl chloride masticated rubber. In sections I and II, ρ_v is strongly influenced by polarization. This is proved by the strong dependence of ρ_v on τ and by the reduced current strength as compared to the value at the beginning of the experiment. The minimum ρ_v in section II is related to the dipole polarization effecting the so-called "dipole electric losses" in alternating fields. In section III, ρ_v is determined by the ionic conductivity; this is proved by studies of the influence exerted by admixtures and electrical purification on the conductivity. The product $n_o \mu^2_{ef}$ (n_o = number of polar groups per cm^3 and μ_{ef} = their effective dipole moment) increases from PS to PPCS and SN-28. Therefore, the dielectric losses and the influence of dipole polarization on ρ_v increase near T_v. For τ = 15, in the minimum range ρ_v amounts for PS to $2.5 \cdot 10^{16}$, for PPCS to $6 \cdot 10^{14}$, and for SN-28 to $2 \cdot 10^{14}$ ohm cm. ε " is ob-

Card 4/10

Study of the electrical....

tained from φ, according to formula (1). Contrary to other polymers, ε_v for PS, PPCS, and SN-28 between 100 and 1500 v is independent of the voltage applied to the specimen. Fig. 3a shows the logarithm of the charge current (black points) and of the discharge current (clear circles) as a function of logarithm τ at various temperatures. In the first interval of τ, ε'' is considerably influenced by polymerization, in the second, by the ionic conductivity. The maxima of ε'' of curve 3a for SN-28 between 100 and 130°C and of curve 3b for PPCS between 120 and 170°C are equal for 10, and 50 cps so that they may be used for the quantitative determination of the dipole electric losses. At low frequencies (Fig. 4), there occur additional losses due to the ionic conductivity besides the dipole electric losses. The function $\varepsilon'' = \varphi(\log f)$ represented in Fig. 6a is remarkable because of its asymmetry in the entire temperature range measured (138 to 173°C), which agrees with the values found for halostyrenes and may be due to the overlapping of two relaxation processes. The mechanical losses near T_v found for PPCS, other styrenes, and their derivatives may be due to mobile side radicals at $T < T_c$. There are 6 figures and 14 references.

Card 5/10

S/190/61/003/005/011/014
22568
B110/B220

Study of the electrical...

7 Soviet-bloc and 7 non-Soviet-bloc. The two references to English-language publications read as follows: Ref. 13: S. Saito et al. J. Appl. Polymer. Sci., 2, 93, 1959. Ref. 14: K. H. Illers et al. Rheol. Acta, 1, 322, 1958, J. Polymer Sci., 41, 528, 1959.

ASSOCIATION: Nauchno-issledovatel'skiy polimerizatsionnykh plastmass (Scientific Research Institute of Polymer Plastics)

SUBMITTED: September 5, 1960

Fig. 1: Circuit diagram of the measuring device for specific electric resist-ances at short periods (0.01÷1 sec); Cx = specimen; 1 and 2 = tregohmmeter of the type MOM-4 and oscillo-scope of the type MPO-2 (MPO-2); P = electromagnetic relay; R = resistance 10^7 ohms; Π_p = fuse.

FIG 1
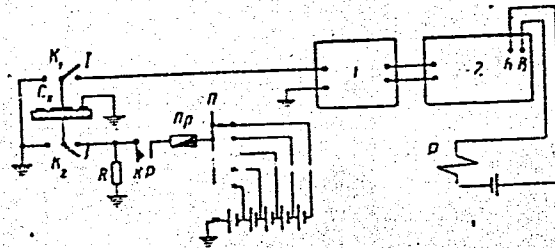
Card 6/10

AUTHORS: Sazhin, B. I., Eydel'nant, M. P.

TITLE: The electric conductivity of polymers. V. Polycarbonate,
             polyethylene terephthalate, mixed polyester, poly-oxy-
             methylene

TEXT: The dependence of volume resistivity (β_v) on temperature (from -180 to +200°C) and on the duration of the charge ($\tau = 0.01 - 1200$ sec) was studied with crystalline polyesters, for which dipole-elastic and dipole-radical polarization is characteristic: polycarbonate (PK), polyethylene terephthalate (PET), mixed polyester TC3-80(TSE-80) from terephthalic acid, sebacic acid and ethylene glycol as well as poly-oxymethylene (POM). It was found that in the vicinity of the brittle temperature the volume resistivity of the polymers investigated is determined by the dipole-elastic polarization and conductance. For $T < T_{br}$, β_v changes only slightly with the temperature and much depends on τ, i. e., β_v as a function of τ and T essentially depends

Card 1/3

S/190/62/004/004/014/019
B117/B138

The electric conductivity of...

on the appearance of dipole-radical polarization. It was shown that, for all polymers investigated the values of β_v above a certain temperature T_1 (for $\tau > 14$ sec) are independent of τ and are determined by the conductance. For PK and PET it was found that their β_v values decrease in this range, during transition from glowed to quenched samples, by 1-3 orders of magnitude, and in the range of the appearance of dipole-elastic polarization to about one fifth. Thus, the conductance of PK and PET is much reduced during crystallization. For TSE-80 and POM, where various types of dipole losses are superimposed, the quantity of the imaginary part of the dielectric constant (ϵ'') was determined from $\beta_v(\tau = 1$ sec) on the basis of the theory of dielectric losses. The dependences $\epsilon'' - T$ were shown to take a different course for $f = 0.1$ cycle than for 20 kilocycles. The maximum appearing at $-100°C$ ($f = 0.1$ cycle) was asymmetric, while a symmetric maximum was observed at $-50°C$ (20 kilocycles). This change of the $\epsilon'' - T$ curve is probably connected with two relaxation processes with different activation energy, which determine the losses observed for TSE-80 and POM at low temperatures. Processes with a shorter probable relaxation time also have a lower activation energy. The two loss maxima can be observed only on low

Card 2/3

The electric conductivity of...

S/190/62/004/004/014/019
B117/B138

frequencies, since with a temperature increase the difference between the probable relaxation times gets smaller and smaller. There are 5 figures and 1 table.

ASSOCIATION: Nauchno-issledovatel'skiy institut polimerizatsionnykh plastmass (Scientific Research Institute of Polymerization Plastics)

SUBMITTED: March 20, 1961

Card 3/3